

CLAIMS:

What is claimed is:

1. A side impact airbag system for a vehicle including front wheels, rear wheels and a frame defining a front of the vehicle, a rear of the vehicle and first and second sides of the vehicle, said airbag system comprising:
a system housing defining an interior space, said system housing being arranged on the first side of the vehicle alongside at least a portion of a passenger compartment of the vehicle,
at least one inflatable airbag arranged in said interior space of said system housing such that when inflating, said at least one airbag is expelled from said system housing into the passenger compartment,
inflator means arranged at least partially within said interior space of said system housing for inflating said at least one airbag, said inflator means comprising an inflator housing containing propellant, and
a crash sensor for initiating inflation of said at least one airbag via said inflator means upon a determination of a crash requiring inflation of said at least one airbag,
said crash sensor comprising
a sensor housing arranged within said system housing, and
a sensing mass arranged in said sensor housing to move relative to said sensor housing in response to accelerations of said sensor housing resulting from the crash into the first side of the vehicle such that upon movement of said sensing mass in excess of a threshold value, said crash sensor initiates said inflator means to inflate said at least one airbag.
2. The system of claim 1, wherein said crash sensor is an electronic sensor and the movement of said sensing mass is monitored.
3. The system of claim 2, wherein said electronic sensor is arranged to generate a signal representative of the movement of said sensing mass.
4. The system of claim 3, wherein said signal is monitored and recorded over time.

5. The system of claim 3, wherein said electronic sensor further comprises a micro-processor and an algorithm for determining whether the movement over time of said sensing mass as processed by said algorithm results in a calculated value which is in excess of the threshold
5 value based on said signal.

6. The system of claim 1, wherein said crash sensor further comprises an accelerometer, said sensing mass constituting part of said accelerometer.

7. The system of claim 6, wherein said sensing mass is micro-machined acceleration sensing mass , said electronic sensor further comprising a micro-processor for determining whether the movement of said sensing mass over time results in an algorithmic determined value which is in excess of the threshold value based on said signal.

15 8. The system of claim 6, wherein said accelerometer includes a piezo-electric element for generating a signal representative of the movement of said sensing mass, said electronic sensor further comprising a micro-processor for determining whether the movement of said sensing mass over time results in an algorithmic determined value which is in excess of the threshold value based on said signal.

20 9. The system of claim 6, wherein said inflator means comprise a primer, said crash sensor including an electronic circuit including said accelerometer and said primer such that upon movement over time of said sensing mass results in a calculated value in excess of the threshold value, the electronic circuit is completed thereby causing ignition of said primer.

25 10. The system of claim 1, wherein said system housing comprises a mounting plate having a bottom wall and flanged side walls, said bottom wall having an aperture, said inflator housing being arranged in said aperture.

11. The system of claim 1, wherein said sensor housing is mounted directly to said inflator housing.

5 12. The system of claim 1, wherein the first side of the vehicle has a door and said system housing is arranged inside said door.

10 13. The system of claim 1, wherein a portion of the first side of the vehicle has inner and outer panels not associated with a door of the vehicle, said system housing being arranged between said inner and outer panels.
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14. The system of claim 1, further comprising a capacitor arranged within said system housing to supply power to initiate deployment of said airbag system.

15 15. The system of claim 1, further comprising an electronic diagnostic system arranged within said system housing to permit diagnoses of a fault within said airbag system.

20 16. An airbag safety restraint system for a vehicle comprising:
an inflatable airbag having an interior,
an inflator assembly having an inflator housing, an ignitable gas generating material contained in said inflator housing and at least one passage extending between said gas generating material and said interior of said airbag such that upon ignition of said gas generating material, gas is generated and flows through said at least one passage into said interior of said airbag to inflate said airbag, and

25 an electronic crash sensor for causing ignition of said gas generating material upon a determination of a crash requiring inflation of said airbag,

said crash sensor comprising

a sensor housing,

30 a sensing mass arranged in said sensor housing to move relative to said sensor housing in response to accelerations of said sensor housing resulting from the crash, a signal representative of the movement of said sensing mass being generated, and

a micro-processor comprising an algorithm for determining whether the movement of said sensing mass over time results in a calculated value which is in excess of a threshold value based on the signal such that if the movement over time of said sensing mass results in a calculated value which is in excess of the threshold value, said micro-processor causes ignition of gas generating material and thus inflation of said airbag.

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The system of claim 16, wherein said sensor housing is mounted proximate to said inflator housing.

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18. The system of claim 16, wherein said crash sensor further comprises an accelerometer, said sensing mass constituting part of said accelerometer.

19. The system of claim 18, wherein the sensing mass is a micro-machined element.

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20. The system of claim 18, wherein said accelerometer includes a piezo-electric element for generating said signal.

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21. The system of claim 18, wherein said inflator assembly further comprises a primer for igniting said gas generating material, said crash sensor including an electronic circuit including said accelerometer and said primer such that upon movement of said sensing mass over time resulting in a calculated value in excess of the threshold value, the electronic circuit is completed thereby causing ignition of said primer.

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22. An airbag safety restraint system for a vehicle comprising:

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an inflatable airbag having an interior,

an inflator assembly having an inflator housing, an ignitable gas generating material contained in said inflator housing and at least one passage extending between said gas generating material and said interior of said airbag such that upon ignition of said gas generating material, gas is generated and flows through said at least one passage into said interior of said airbag to inflate said airbag, and

an electronic crash sensor for causing ignition of said gas generating material upon a determination of a crash requiring inflation of said airbag.

said crash sensor comprising

a sensor housing, and

5 an accelerometer arranged in said sensor housing and including a sensing mass movable relative to said sensor housing in response to accelerations of said sensor housing resulting from the crash, said accelerometer being arranged to generate a signal representative of the movement of said sensing mass over time, said crash sensor being arranged to cause ignition of said gas generating material if the movement over time of said sensing mass represented by
10 said signal results in a calculated value which is in excess of a threshold value.

23. The system of claim 22, wherein said sensor housing is mounted proximate to said inflator housing.

15 24. The system of claim 22, wherein said sensing mass is a micro-machined element.

20 25. The system of claim 22, wherein said accelerometer includes a piezo-electric element for generating said signal.

25 26. The system of claim 22, wherein said inflator assembly further comprises a primer for igniting said gas generating material, said crash sensor including an electronic circuit including said accelerometer and said primer such that upon movement over time of said sensing mass results in a calculated value in excess of the threshold value, the electronic circuit is completed thereby causing ignition of said primer.

26 27. The system of claim 22, wherein said crash sensor further comprises a micro-processor for determining whether the movement over time of said sensing mass results in a calculated value which is in excess of the threshold value based on said signal.

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28. A side impact airbag system for a vehicle including front wheels, rear wheels and a frame defining a front of the vehicle, a rear of the vehicle and first and second sides of the vehicle, said airbag system comprising:

5 a system housing defining an interior space, said system housing being arranged on the first side of the vehicle alongside at least a portion of a passenger compartment of the vehicle,

at least one inflatable airbag arranged in said interior space of said system housing such that when inflating, said at least one airbag is expelled from said system housing into the passenger compartment,

10 inflator means arranged at least partially within said interior space of said system housing for inflating said at least one airbag, said inflator means comprising an inflator housing containing propellant, and

15 a crash sensor for initiating inflation of said at least one airbag via said inflator means upon a determination of a crash requiring inflation of said at least one airbag,

20 said crash sensor comprising

15 a sensor housing arranged proximate to said inflator housing, and

25 a sensing mass arranged in said sensor housing to move relative to said sensor housing in response to accelerations of said sensor housing resulting from the crash into the first side of the vehicle such that upon movement of said sensing mass in excess of a threshold value, said crash sensor initiates said inflator means to inflate said at least one airbag.

20 29. The system of claim 28 wherein the threshold value is the maximum motion of said sensing mass required to determine that a crash requiring deployment of said at least one airbag is taking place.

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